

Sub B1
5 21. (AMENDED ONCE) A well treatment tool, comprising

a generally cylindrical body for installing generally concentrically within a production tube string and coupled to a treatment fluid string and for distributing well treatment fluid from the [sucker rod string] treatment

10 fluid string and into the production tube string, with at least the portion of the treatment fluid string disposed above said cylindrical body being hollow;

15 said body including an upper end having an axial fluid entrance passage therein for accepting treatment fluid from the treatment fluid string disposed thereabove;

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20 said body further including at least one treatment fluid distribution passage extending outwardly from said body;

valve means disposed within said body;

25 said valve means including an inlet end communicating with said fluid entrance passage and opposite outlet end communicating with said fluid distribution passage; and

attachment means for attaching said body to the treatment fluid string.

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5 22. The well treatment tool according to claim 21, wherein the production tube string has an internal diameter, and said body has a maximum diameter smaller than the internal diameter of the production tube string to define a production fluid passage therebetween.

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23. The well treatment tool according to claim 21, wherein said valve means comprises a normally closed ball check valve.

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24. The well treatment tool according to claim 21, wherein said at least one treatment fluid distribution passage comprises a plurality of radially disposed passages extending from said outlet end of said valve, outwardly through said body.

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5 25. A producing well having at least a production tube string disposed generally concentrically therein and, comprising in combination:

a well treatment tool having a generally cylindrical body for installing concentrically in line with a treatment fluid string and for distributing well
10 treatment fluid from said treatment fluid string and into said production tube string, with said treatment fluid string including at least a hollow portion disposed above said cylindrical body;

said body of said well treatment tool including an upper end having an
15 axial fluid entrance passage therein for accepting treatment fluid from said treatment fluid string;

said body of said well treatment tool further including at least one treatment fluid distribution passage extending outwardly from said body of
20 said well treatment tool;

valve means disposed within said body of said well treatment tool;

said valve means including an inlet end communicating with said fluid
25 entrance passage and opposite outlet end communicating with said fluid distribution passage; and

attachment means, for attaching said body to said treatment fluid string.

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5 26. The producing well and well treatment tool combination according to claim 25 wherein said production tube string has an internal diameter, and said body of said well treatment tool has a maximum diameter smaller than said internal diameter of said production tube string to define a production fluid passage therebetween.

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27. The producing well and well treatment tool combination according to claim 25, wherein said valve means of said well treatment tool body comprises a normally closed ball check valve.

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28. The producing well and well treatment tool combination according to claim 25, wherein said at least one treatment fluid distribution passage of said well treatment tool body comprises a plurality of radially disposed passages extending from said outlet end of said valve, outwardly through said body.

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- 5 29. A method of treating a producing well having at least a production tube string disposed generally concentrically therein, with the production tube string having a production fluid flowing upwardly therethrough to an initial treatment and storage system, the method comprising the following steps:
- 10 (a) providing a well treatment tool having a generally cylindrical body, an upper end having an axial fluid entrance passage therein for accepting well treatment fluid from a treatment fluid string disposed thereabove, and at least one treatment fluid distribution passage extending outwardly from the body;
- 15 (b) installing the tool at a predetermined depth in the well, with the fluid entrance passage communicating with the interior of the treatment fluid string;
- 20 (c) dispensing a well treatment fluid under pressure downwardly from the surface, through the treatment fluid string to the well treatment tool;
- (d) distributing the well treatment fluid from the treatment fluid distribution passage of the well treatment tool, into the production tube string; and
- 25 (e) flushing the well treatment fluid upwardly with the production fluid, through the production tube string and into the initial treatment and storage system.

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5 30. The method of treating a producing well according to claim 29,
including the step of providing a valve disposed within the body, with the
valve including an inlet end communicating with the fluid entrance passage
of the body and opposite outlet end communicating with the fluid
distribution passage.

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31. The method of treating a producing well according to claim 30,
including the step of providing a normally closed ball check valve for the
valve.

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5 32. The method of treating a producing well according to claim 29,
including the steps of:

(a) defining an internal diameter for the production tube string;

10 (b) providing a maximum diameter for the body of the well treatment tool,
less than the internal diameter of the production tube string; and

(c) defining a production fluid passage between the internal diameter of the
production tube string and the body of the well treatment tool.

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5 33. The method of treating a producing well according to claim 29,
including the step of providing a plurality of radially disposed treatment
fluid distribution passages extending from said outlet end of the valve,
outwardly through the body.

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35. The method of treating a producing well according to claim 29,
including the steps of:

(a) providing oil with a paraffin component mixed therein as the production
15 fluid; and

(b) providing a paraffin solvent as the well treatment fluid.

5 36. (AMENDED ONCE) A well treatment tool comprising:

(a) a tank for containing a supply of well treatment fluid;

10 (b) at least one treatment fluid line defining a treatment delivery fluid pathway which is coupled to at least said tank;

(c) a treatment fluid pump coupled to said at least one treatment fluid line and said tank;

15 (d) a wellbore fluid string extending downward into a wellbore a predetermined distance and including a central bore which is in fluid communication with said said tank, said at least one fluid treatment line, and said treatment fluid pump for receiving and delivering well treatment fluid to a subsurface location;

20 (e) a treatment tool coupled to said wellbore fluid string for receiving said well treatment fluid from said central bore of said wellbore fluid string and delivering said wellbore treatment fluid into a particular portion of said wellbore;

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(f) said treatment tool including:

a tool body having an inlet for coupling to said wellbore fluid string and receiving wellbore treatment fluid from said wellbore fluid string;

30 at least one outlet for delivering wellbore treatment fluid into said particular portion of said wellbore;

a valve positioned between said inlet and said outlet for regulating the delivery of wellbore treatment fluid into said wellbore by checking the

5 flow of wellbore treatment fluid until said a pressure of said wellbore treatment fluid exceeds a predetermined pressure level and releasing wellbore treatment fluid when said pressure of said wellbore treatment fluid exceeds said predetermined pressure level;

10 (g) wherein said treatment fluid pump continually supplies and pressurizes said wellbore treatment fluid into said wellbore fluid string and said treatment tool; and

(h) wherein said treatment tool intermittently supplies wellbore treatment fluid into said wellbore.

5 37. A wellbore treatment tool, according to claim 36, further comprising:

(h) wherein said tank, said at least one treatment fluid line, and said treatment fluid pump are located at a surface location; and

(i) wherein said treatment tool is located in a subsurface location.

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38. A wellbore treatment tool, according to claim 36, further comprising:

(h) wherein said treatment tool is located within a wellbore tubular string which defines a production pathway which permits the flow of wellbore

15 fluids from a surface location to a surface location, and operates to inject said wellbore treatment fluid into said wellbore fluids; and

(i) wherein said wellbore treatment fluid operates to prevent the accumulation of undesirable foreign matter such as paraffin on said

20 wellbore tubular string which would other wise obstruct the production pathway.

39. A wellbore treatment tool, according to claim 38, further comprising:

25 (i) surface equipment including separation and storage equipment located at a surface location and adapted to receive said wellbore fluids from said wellbore; and

(j) wherein said wellbore treatment fluid operates to prevent the
30 accumulation of undesirable foreign matter, such as paraffin, on said surface equipment which would other wise obstruct flow.

5 40. A wellbore treatment tool, according to claim 36, wherein said wellbore fluid string comprises a sucker rod string which is concentrically disposed within a production tubing string.

10 41. A wellbore treatment tool, according to claim 36, wherein said wellbore fluid string functions primarily to deliver wellbore treatment fluid to said treatment tool.

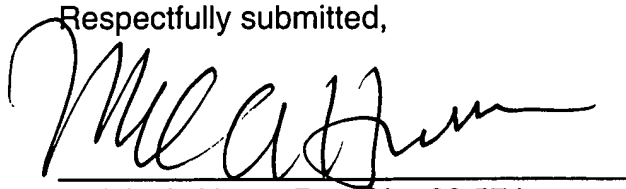
15 42. A wellbore treatment tool, according to claim 41, wherein said wellbore is a wellbore of a type which does not utilize a sucker-rod type lift system.

43. A wellbore treatment tool, according to claim 41, wherein said wellbore is a flowing wellbore.

No other fees are deemed to be necessary; however, the undersigned hereby authorizes the Commissioner to charge any fees that are required, or credit any overpayments, to Deposit Account No. 50-1060.

13 Sep 2002
Date

Respectfully submitted,



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21. (AMENDED ONCE) A well treatment tool, comprising:

10 a generally cylindrical body for installing generally concentrically within a production tube string and coupled to a treatment fluid string and for distributing well treatment fluid from the treatment fluid string and into the production tube string, with at least the portion of the treatment fluid string disposed above said cylindrical body being hollow;

15 said body including an upper end having an axial fluid entrance passage therein for accepting treatment fluid from the treatment fluid string disposed thereabove;

20 said body further including at least one treatment fluid distribution passage extending outwardly from said body;

valve means disposed within said body;

25 said valve means including an inlet end communicating with said fluid entrance passage and opposite outlet end communicating with said fluid distribution passage; and

attachment means for attaching said body to the treatment fluid string.

5 22. The well treatment tool according to claim 21, wherein the production tube string has an internal diameter, and said body has a maximum diameter smaller than the internal diameter of the production tube string to define a production fluid passage therebetween.

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23. The well treatment tool according to claim 21, wherein said valve means comprises a normally closed ball check valve.

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24. The well treatment tool according to claim 21, wherein said at least one treatment fluid distribution passage comprises a plurality of radially disposed passages extending from said outlet end of said valve, outwardly through said body.

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5 25. A producing well having at least a production tube string disposed generally concentrically therein and, comprising in combination:

a well treatment tool having a generally cylindrical body for installing concentrically in line with a treatment fluid string and for distributing well
10 treatment fluid from said treatment fluid string and into said production tube string, with said treatment fluid string including at least a hollow portion disposed above said cylindrical body;

said body of said well treatment tool including an upper end having an
15 axial fluid entrance passage therein for accepting treatment fluid from said treatment fluid string;

said body of said well treatment tool further including at least one treatment fluid distribution passage extending outwardly from said body of
20 said well treatment tool;

valve means disposed within said body of said well treatment tool;

said valve means including an inlet end communicating with said fluid
25 entrance passage and opposite outlet end communicating with said fluid distribution passage; and

attachment means, for attaching said body to said treatment fluid string.

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5 26. The producing well and well treatment tool combination according to claim 25 wherein said production tube string has an internal diameter, and said body of said well treatment tool has a maximum diameter smaller than said internal diameter of said production tube string to define a production fluid passage therebetween.

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27. The producing well and well treatment tool combination according to claim 25, wherein said valve means of said well treatment tool body comprises a normally closed ball check valve.

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28. The producing well and well treatment tool combination according to claim 25, wherein said at least one treatment fluid distribution passage of said well treatment tool body comprises a plurality of radially disposed
20 passages extending from said outlet end of said valve, outwardly through said body.

- 5 29. A method of treating a producing well having at least a production tube string disposed generally concentrically therein, with the production tube string having a production fluid flowing upwardly therethrough to an initial treatment and storage system, the method comprising the following steps:
- 10 (a) providing a well treatment tool having a generally cylindrical body, an upper end having an axial fluid entrance passage therein for accepting well treatment fluid from a treatment fluid string disposed thereabove, and at least one treatment fluid distribution passage extending outwardly from the body;
- 15 (b) installing the tool at a predetermined depth in the well, with the fluid entrance passage communicating with the interior of the treatment fluid string;
- 20 (c) dispensing a well treatment fluid under pressure downwardly from the surface, through the treatment fluid string to the well treatment tool;
- (d) distributing the well treatment fluid from the treatment fluid distribution passage of the well treatment tool, into the production tube string; and
- 25 (e) flushing the well treatment fluid upwardly with the production fluid, through the production tube string and into the initial treatment and storage system.
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5 30. The method of treating a producing well according to claim 29,
including the step of providing a valve disposed within the body, with the
valve including an inlet end communicating with the fluid entrance passage
of the body and opposite outlet end communicating with the fluid
distribution passage.

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31. The method of treating a producing well according to claim 30,
including the step of providing a normally closed ball check valve for the
valve.

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5 32. The method of treating a producing well according to claim 29,
including the steps of:

(a) defining an internal diameter for the production tube string;

10 (b) providing a maximum diameter for the body of the well treatment tool,
less than the internal diameter of the production tube string; and

(c) defining a production fluid passage between the internal diameter of the
production tube string and the body of the well treatment tool.

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5 33. The method of treating a producing well according to claim 29,
including the step of providing a plurality of radially disposed treatment
fluid distribution passages extending from said outlet end of the valve,
outwardly through the body.

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35. The method of treating a producing well according to claim 29,
including the steps of:

(a) providing oil with a paraffin component mixed therein as the production
15 fluid; and

(b) providing a paraffin solvent as the well treatment fluid.

5 ³⁵ 36. (AMENDED ONCE) A well treatment tool comprising:

(a) a tank for containing a supply of well treatment fluid;

10 (b) at least one treatment fluid line defining a treatment delivery fluid pathway which is coupled to at least said tank;

(c) a treatment fluid pump coupled to said at least one treatment fluid line and said tank;

15 (d) a wellbore fluid string extending downward into a wellbore a predetermined distance and including a central bore which is in fluid communication with said said tank, said at least one fluid treatment line, and said treatment fluid pump for receiving and delivering well treatment fluid to a subsurface location;

20 (e) a treatment tool coupled to said wellbore fluid string for receiving said well treatment fluid from said central bore of said wellbore fluid string and delivering said wellbore treatment fluid into a particular portion of said wellbore;

25 (f) said treatment tool including:

a tool body having an inlet for coupling to said wellbore fluid string and receiving wellbore treatment fluid from said wellbore fluid string;

30 at least one outlet for delivering wellbore treatment fluid into said particular portion of said wellbore;

a valve positioned between said inlet and said outlet for regulating the delivery of wellbore treatment fluid into said wellbore by checking the flow of wellbore treatment fluid until said a pressure of said wellbore

5 treatment fluid exceeds a predetermined pressure level and releasing wellbore treatment fluid when said pressure of said wellbore treatment fluid exceeds said predetermined pressure level;

10 (g) wherein said treatment fluid pump continually supplies and pressurizes said wellbore treatment fluid into said wellbore fluid string and said treatment tool; and

(h) wherein said treatment tool intermittently supplies wellbore treatment fluid into said wellbore.

5 37. A wellbore treatment tool, according to claim 36, further comprising:

(h) wherein said tank, said at least one treatment fluid line, and said treatment fluid pump are located at a surface location; and

(i) wherein said treatment tool is located in a subsurface location.

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38. A wellbore treatment tool, according to claim 36, further comprising:

(h) wherein said treatment tool is located within a wellbore tubular string which defines a production pathway which permits the flow of wellbore

15 fluids from a surface location to a surface location, and operates to inject said wellbore treatment fluid into said wellbore fluids; and

(i) wherein said wellbore treatment fluid operates to prevent the accumulation of undesirable foreign matter such as paraffin on said

20 wellbore tubular string which would other wise obstruct the production pathway.

39. A wellbore treatment tool, according to claim 38, further comprising:

25 (i) surface equipment including separation and storage equipment located at a surface location and adapted to receive said wellbore fluids from said wellbore; and

(j) wherein said wellbore treatment fluid operates to prevent the
30 accumulation of undesirable foreign matter, such as paraffin, on said surface equipment which would other wise obstruct flow.

5 40. A wellbore treatment tool, according to claim 36, wherein said wellbore
fluid string comprises a sucker rod string which is concentrically disposed
within a production tubing string.

10 41. A wellbore treatment tool, according to claim 36, wherein said wellbore
fluid string functions primarily to deliver wellbore treatment fluid to said
treatment tool.

15 42. A wellbore treatment tool, according to claim 41, wherein said wellbore
is a wellbore of a type which does not utilize a sucker-rod type lift system.

43. A wellbore treatment tool, according to claim 41, wherein said wellbore
is a flowing wellbore.